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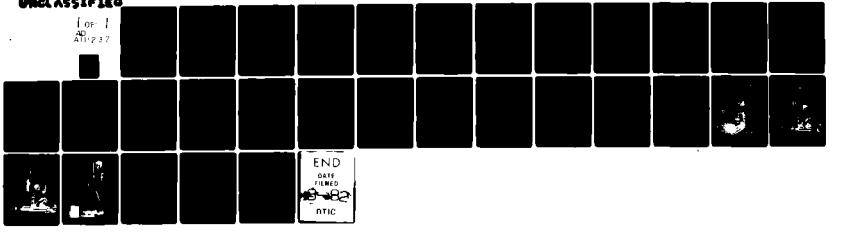

Analysis and Prediction of Attrition and Criterion Tasks Performance During Military Training

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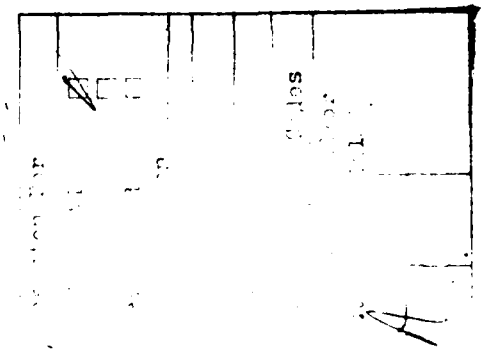
(Abstract)

The present research evaluated aspects of physical work capacity, background, and psychological coping strategies and their relationship to criterion military task performance and attrition from basic training. It attempted to develop a selection instrument that could be utilized as part of a pre-training screening device to optimize both personnel selection and subsequent occupational assignment and training in the U.S. Armed Forces. Thirteen hundred men and women recruits were measured at the beginning of recruit training; subsequent discriminant analysis of graduates and dropouts demonstrated significant differences on five variables, including physical self comparison, reports of physical ailments, ability to cope with situational stress, body composition and age and correctly classified 30% of the dropouts. When these variables were subjected to a stepwise multiple regression, a predictive validity of .50 and .04 was observed for female and male dropouts respectively. Likewise, the use of multiple regression for the prediction of criterion task performances resulted in significant multiple Rs ranging from .45 to .67 using strength measurement alone. The results support the usefulness and efficacy of a multivariate test device for the identification of dropouts and the prediction of selected task performance prior to training. The application of the findings to the personnel selection and training process have varied implications which are discussed.



A recent review (1) of the employee turnover literature has found a paucity of adequate data or models for the prediction of attrition. One of the most significant omissions in these data is the lack of multivariate analysis (2) of variables in a longitudinal framework, as well as the lack of any criterion performance measures. Attrition in the armed forces has been reviewed by several investigators (3). Their work has placed relatively greater emphasis on the nature and assessment of reenlistment, rather than attrition data; on demographic, rather than task performance variables and has used cross sectional, rather than longitudinal designs. Furthermore, with the advent of the All Volunteer Army the applicability of much of the pre 1974 research becomes questionable.

The need for further research into the factors involved in attrition, military job or task performance, and the prediction of these factors before a trainee enters service becomes important as the cost of training recruits and the dropout rate increase. This problem is exemplified by the 30% attrition among enlistees in the Navy and the greater than 20% attrition during Army basic training. Recently it was reported (17) that approximately 9% of recruits being enlisted in the armed forces were quickly discharged for a variety of reasons ranging from being physically unable to perform military duties to lacking aptitude for service. The cost of this rapid attrition of recruits was placed at upwards of 190 million dollars a year. This is not to mention the intangible costs in terms of discipline problems, and administrative and legal complications which could not be assessed. Certainly, among military managers these statistics have raised concerns over the adequacy of the man-power force and the cost effectiveness of the selection and training programs as currently implemented (4).

The objective of this study was to evaluate the ability of a physical work

capacity test along with other available data, both anthropometric and demographic, to identify factors which would predict premature separation from service, and/or inadequate performance on relevant military tasks during basic training and subsequent military occupational speciality (MOS) training prior to entry into service.

Method

Subjects: The sample population in the study was composed of 854 men and 453 women undergoing basic training at a large Army installation during the months of January -March 1978. The initial demographic, anthropometric, and physical test battery data for this sample are presented in Table 1. Following training, the recruits were identified by their final disposition: i.e. completed basic training and sent to advanced individual training (Disp 1); recycled into a subsequent basic training cycle because of missed training or illness (Disp 2); given a medical discharge due to a disqualifying injury or condition (Disp 3); or given an administrative discharge based upon an inability to adapt to training or the military environment (Disp 4).

Procedures and Equipment: The components of the work capacity test battery were selected based on the following considerations. They had to be simple and inexpensive to administer; also, they had to be brief, safe and not excessively stressful. Furthermore, the test battery had to include the major components of work capacity, (i.e. stamina or aerobic power and muscular strength of the major muscle groups); measurements of body composition, exercise history and assessment of psychological coping strategy and physical self-esteem were also assessed.

The stamina test selected was a three load continuous stepping test. It consisted of stepping at a rate of 25 steps per minute at a cadence of 100 beats per

minute (full cycle) at three of four possible step heights: 10, 20, 30 or 40 cm. In our testing, men stepped at the 20, 30 and 40 cm levels and the women at the 10, 20, and 30 cm levels. The loads covered the entire range of fitness capacity for which this test may be used. This procedure allowed for comparability of heart rate measures between these subjects, i.e. the rates were in the range of 120-170 beats/minute. The test continued for three minutes at each level and proceeded immediately to the next level without interruption. The stepping apparatus can be seen in detail in Fig. 1.

The design for our isometric strength device was based on equipment originally developed for the Norwegian Army by Hermansen (8) for a similar purpose. However, for our application it was necessary that all measurements be incorporated into a single free standing device*. Details of the device, procedures, and reliability data are discussed in another publication (9). The strength measures included those of the leg extensors (Fig. 2), of the upper torso (arms and shoulders) (Fig. 3), and the trunk flexors (Fig. 4). In addition to the standard height and weight measurements, body composition was estimated by using the skinfold technique and the equation of Durnin and Wormesley (10).

The psychological instruments included the Health Opinion Survey (HOS) which assesses the individual's predisposition to psychosomatic ailments (11) and the Response to Life Problems (RTLP) which purports to assess a person's ability to mobilize internal forces to cope with environmental or situational stress. Activity history (previous athletic participation) and comparative fitness (self perception of fitness) relative to others of the same sex and age prior to entering training were assessed using a 5 point scale: 1 equal to low activity or fitness up to 5 which equales high activity or fitness.

The Army Physical Fitness Test (APFT) and a series of Common Soldiering Tasks (CST) were the primary task performance criteria. The tasks were selected by the Infantry School at Ft. Benning, Georgia as representing basic skills and capacities that every soldier must possess before completing basic training. The tasks are outlined in Table 5. These tasks were administered during the final week of the training cycle and the performance scores were recorded.

The statistical analyses consisted of 1) univariate comparisons of trainees classified into two groups: successful completion of basic training (GP1) or discharge from service due to medical or administrative reasons (GP2); 2) discriminate function analysis based on this twofold classification; and 3) a multiple regression analysis using the pre-training test battery measurements for the prediction of criterion tasks performance at the completion of basic training.

Results

Over the course of the eight week basic training the attrition rate was 12% for both men and women. Table 1 presents a summary of the data collected during

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*Few studies have been done using actual military tasks as criteria for evaluating the efficacy of a pre-induction test battery. However, several investigators (6,) have found that isometric strength tests did predict performance on certain work tasks and overall physical work capacity. Based on an analysis of the components of muscular strength by Borchardt (7), we developed an isometric strength apparatus for the assessment of the muscular strength of recruits. Such an apparatus must minimized the problem of motivation and be safe and reliable across a wide range of capacity.

the pre-training assessment. These work capacity variables displayed a significant difference between males and females. However, this is to be expected since women have, on the average, about 20% less lean muscle body mass than men. Figure 6 demonstrates the comparative relationship that exists for selected physical measures. These percent discrepancies were reduced following training since women usually start training at lower levels of their physical potential and improve more in response to a training program.

Table 2 presents a comparison for men and women based on whether they completed basic training (GP 1) or were discharged from service (GP 2). Following initial analysis, Disposition 1 and 2 (completed basic training or were recycled) were identical, both in actual training outcome (both groups completed basic training) and, statistically, i.e. in mean scores across the test battery. Therefore, they were consolidated for analysis as having completed training (GP 1). Likewise, Disposition 3 and 4 (discharged for either medical or administrative reasons) were consolidated for analysis (GP 2) because both were discharged from service although for different reasons. The groups differed significantly on HOS scores, comparative fitness levels, age, strength of legs and trunk, and lean body mass components of the test battery. However, the fact that only 12% of the sample were in GP 2 created a substantial discrepancy in sample size and a subsequent restriction of range that reduced the degree of relationship.

Since variables may be interrelated in a test battery such as this, a multivariate analysis technique was used to assess which combination of variables optimally discriminated between the two groups. A stepwise discriminate analysis (BMDP7M) was used to identify the underlying dimensionality and the contribution of individual variables to the prediction of recruit attrition (Table 3). The

discriminant functions were significant and differentiated the two groups using 5 of the variables for the combined male and female groups. Physical self-comparison, the HOS, and age at entry into training were included in all the discriminant functions. Classification matricies are presented in Table 4. These tables provide a indication of the efficacy of these discriminant functions.

In the male and female combined group, the function correctly classified 88.6% of GP 1 but only 25% of GP 2. When the classification was done for males and females separately, the discriminant function demonstrated an almost identical correct classification for men and women (men, 87.6%; women, 87.7%) completing basic training and for those discharged, (men, 29.1%; and women, 29.6%). The major reasons for administrative discharge were either unsuitability for service due to apathy, attitude, or failure to adjust to the military life. A multiple regression analysis was performed with the variables presented in Table 3 to partition the variance associated with attrition. Predictive validity was .50 and R^2 (variance accounted for) was 25% for the prediction of female recruit attrition, but accounted for only 4% of the variance for the prediction of male dropouts.

To evaluate how well these work capacity test measurements uniquely covaried with criterion task performance, a stepwise multiple regression analysis was done (BMDP2R) to determine the best linear combination of variables for the prediction of performance on specific criterion tasks. Table 5 summarizes the results of these analyses. As can be seen, upper torso strength contributed significantly to the prediction of several of the performance tasks. It was responsible for the greatest percentage of the variance in task performance for the combined group of trainees. However, other components of the test battery also contributed to the prediction of task performance. In order of contribution to the

predictive equations, these were leg strength and trunk strength. Multiple regression with two variables provided R values from .45 to .67, all of which were significant at $p \leq .01$.

Discussion

The US Supreme Court mandated in the Civil Rights Act of 1964 that performance based criteria would be required for acceptable validation of a selection device, and that such a test would be considered discriminatory if its validity in predicting job performance could not be demonstrated. We have attempted to develop such a performance based assessment device, for the selection of military personnel and their subsequent MOS classification. However, the analysis of the potential benefit in terms of cost effectiveness and the application to the complete spectrum of MOS categories remains to be accomplished.

This study attempted to merge the recruitment, selection and training technologies with information about military tasks and the scientific data on work capacity, to develop a test battery that would optimize personnel selection and training. The implications for the military are manifold. Specifically, it would be important to identify 1) the optimum level of work capacity for different military jobs, 2) the level of recruit work capacity prior to training that was necessary to insure adequate criterion task performance and successful completion of the training program, and 3) the improvement in work capacity that could be expected during a prescribed period of training.

The results of this study revealed that among the sample of men and women entering the service, there were a number of significant differences in physical, anthropometric, and demographic factors. Some of these appeared to be quite

valuable for differentiating those personnel who could withstand the rigors of military basic training from those who would prematurely drop out. As can be seen in Table 2, prior to the beginning of training, dropouts differed significantly on many of the measures taken for both men and women. Specifically, the 12% who were subsequently released from service reported lower levels of physical fitness when asked to compare themselves with other men or women of their own age. The women who dropped out also reported lower levels of previous physical activity, and had lower levels of strength in the major muscle groups. Likewise, the men who were dropouts displayed lower levels of strength and lean muscle mass. Psychologically, the dropouts had a greater tendency for psychosomatic illness and fewer psychological mechanisms to cope with situational stress. These findings support previous research on the role of attitudes about oneself as being among the best predictors of job attrition (12).

In an effort to refine further the predictive validity of these measures, a discriminant function analysis was performed on these data to determine how well the pre-training variables correctly classified the trainees into either the dropout or successful completion category. The correct classification of dropouts was approximately 30% for men and women respectively and about 89% for those who completed basic training. The predictive function included a number of different variables which illustrates the utility of a multivariate analysis over the simple regression approach. Likewise, the significant contributions of physical self assessment and strength measures suggest that these factors may be valuable adjuncts for inclusion in a pre-training screen that may reduce attrition and assist in the identification of individuals who may benefit from some pre-training instruction or supervision. This notion has been further substantiated in a related

publication (13) which showed that these factors also identified trainees who were susceptible to training injury and medical discharge.

Although a predictive validity of 0.50 is considered reputable, these variables accounted for about 25% of the variance for women but only 4% for the men who were dropouts. The lack of a stronger covariance was disappointing, although it may have several explanations. First, the fact that 12% of the sample dropped out of training created a rather severe split in the sample population and imposed a restriction of range limitation on the data. Likewise, these recruits had already gone through several other screenings, which promoted homogeniety within the sample, especially the men. Further, the practice of consolidating the dropouts into one category resulted in a contaminated criterion measure since the administrative dropout and the medical dropout had different precursors (though both represent a loss to the military in terms of training costs). However, to subdivide further the dropouts resulted in a drastic reduction in the sample size and was therefore not done. The fact that the criterion data were collected for only a period of 8 weeks (the recruit training period) further depressed the relationship. This could be improved upon if the sample could be followed into the second phase of training and first enlistment completion, where job skills and capabilities become paramount. Another factor which limited our prediction of attrition was that policy decisions are mandated periodically. These either restrict or expand the acceptable level of recruit attrition. These policy decisions may actually exist at the unit level and confound any attempt at the analysis of attrition.

Although the correct classification of dropouts was only 30%, this is by no means trivial. It has been suggested (1) that the ability to predict even this comparatively small number of dropouts has practical significance with the escalating costs of manpower and training.

The present study also attempted to evaluate the prediction of performance on relevant military criterion tasks to identify pre-training variables that might predict subsequent criterion task performance. This would also provide a normative basis for the development of standards for specific job categories. In almost all cases, the pre-training measures accounted for 30-45% of the variance of task performance. This is quite good considering the low reliability usually found in field performance testing of criterion tasks. The use of multiple regression proved useful since two variables contributed significantly to the prediction of performance on several of the criterion tasks. The fact that the uppper torso (arms and shoulder) strength accounted for much of the variance in the tasks suggests the need for high upper body strength in the performance of these and therefore probably other military tasks. This finding may be a major complication for the assignment of women into physically demanding job classifications, since most women have their greatest weakness in this muscle group compared to men (See Fig 6). In fact, upper body strength, rather than cardiovascular endurance or stamina, may be the limiting factor in the performance of many military tasks. It is encouraging that the values presented here for the prediction of performance tasks from isometric measures are comparable to those reported in the literature for similar military tasks (6).

We have ways of measuring isometric strength but we do not have adequate measures for the motivational component of the individual's work performance. Knowledge of this important component of work capacity would undoubtedly increase our predictive validity.

It should be kept in mind when looking at these data that it is impossible to compare them with others from the literature or even to different groups of

recruits since the high correlations found were not always accompanied by low standard errors (s_e) of measurement. Likewise, in a period of transition, when the nature of the population from which we draw new accessions into the military changing, there is no assurance that the predictive equations generated here are valid for populations other than those they have been developed upon. Therefore, continued revalidation is necessary to insure their utility.

The present results are sufficient to provide the basis for several generalizations and recommendations. It has been shown that recruit attrition is related to pre-training variables that can be assessed at the entrance examination station. These variables include the following factors: physical self comparsion, report of physical ailments, ability to utilize coping strategies to deal with situational stress, body composition, and the age of the individual upon entry into basic training. These data suggest that dropouts, when compared to recruits who successfully complete training, have lower physical self assessment in terms of their comparative fitness levels, and were more likely to report physical ailments or maybe more likely to experience them noting their relatively low level of physical fitness. Likewise, they tended to lack the psychological techniques to deal with the stressful regimen encountered during basic training. The dropouts were also characterized by greater body fat. Greater body fat has been found to be strongly correlated with endurance capacity, being the principle variable in our predictive equation for aerobic capacity. This points to endurance capacity as an essential, but not sufficient, factor for the successful completion of basic training. Likewise, this relation between greater body fat and lower endurance capacity verifies the dropout's self reported low fitness level. It is interesting to note that the older recruits were more likely to become dropouts. It is hard to determine whether

they may have been more susceptible to injury which has been suggested in another study (13) or whether they were less willing to tolerate the rigors of military life and were subsequently discharged for administrative reasons.

It is not surprising that the variables entering the predictive discriminant function were for the most part psychological or perceptual in nature. It seems evident that ones perception and psychological response to a stressful environment or situation will be the primary determinants of a their adaptation to that situation, though the lack of physical work capacity may in part be the basis for this cognitive assessment.

The use of test batteries for selection of personnel have typically been designed to measure specific abilities rather than general capacities. Our test battery was specifically designed to measure basic parameters of work capacity (strength of major muscle groups, stamina, anthropometric and physical self assessment) that would theoretically underlie all task performance. These measures of work capacity could then be used for application to other tasks or constraints i.e. continuous performance, heat, cold, darkness or emergency conditions in the operational setting. However, for this to be accomplished 1) the tasks have to have been throughly analyzed and a taxonomy, along the lines proposed by Fleishman (14) developed, and 2) the test battery factors would have been selected and given appropriate weighting in terms of their specific predictive power. The promise of generality is the prinicple advantage of this approach, but it depends on the development of adequate task-taxonomies to be accomplished if it is to be applied to the whole spectrum of military occupations.

This leads to the hypothesis that a pre-training assessment of these factors during the induction screening procedure could provide an estimate of performance

on criterion tasks currently considered essential for all military recruits, and reduce attrition with only a small increase in screening cost. This study along with other research (1,3,15) serves to emphasize the need for multidimensional, longitudinal, task referenced performance data and analyses. The assessment could also be continued subsequent to basic training to provide a longitudinal data base for the further analysis of attrition and military task performance. This would allow for performance testing to be integrated with job design technology and training programs to increase the available pool of potential candidates for military training, and optimize (both in terms of cost-effectiveness and personal capacity) their training and assignment.

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TABLE 1. MEANS AND STANDARD DEVIATIONS FOR MALE AND FEMALE RECRUITS ON DEMOGRAPHIC AND DESCRIPTIVE VARIABLES PRIOR TO BASIC TRAINING

Variables		Males (N=854)		Females (N=453)
Comparative Fitness Level		3.0 ± .8		2.8 ± .7
Activity History		3.5 ± .9		3.2 ± .9*
Age (Yrs.)		19.9 ± 2.7		20.7 ± 3.2
Educational Level (Grade)		11.5 ± 1.1		12.1 ± .9
High School Graduates (%)		69		100
Racial Composition (% Caucasian)		47		45
Height (cm)		174.3 ± 6.6		162.5 ± 6.8*
Weight (kg)		70.8 ± 10.6		59.1 ± 7.0*
Body Fat (%)		16.2 ± 5.1		27.9 ± 4.7*
Lean Body Mass (kg)		58.8 ± 6.8		42.4 ± 4.6*
Aerobic Test HR (bpm)				
HR 1	20cm	125.1 ± 14.6	10cm	123.1 ± 13.9
HR 2	30cm	145.7 ± 16.4	20cm	144.6 ± 15.4
HR 3	40cm	165.4 ± 15.3	30cm	165.7 ± 15.0
VO_2 Max Predicted (ml/kg/min)		48.5 ± 3.8		38.7 ± 3.4*
Isometric Strength (kg of force)				
Legs		143.1 ± 38.3		92.0 ± 29.3*
Upper Torso		97.7 ± 18.1		55.0 ± 11.1*
Trunk		72.6 ± 18.2		47.4 ± 13.2*
Psychosomatic Complaint (HOS)		29.5 ± 6.4		31.0 ± 5.9*
Coping Strategy (RTLP)		59.1 ± 9.0		59.1 ± 8.8

*$p \leq .01$

TABLE 2. MEANS AND STANDARD DEVIATIONS FOR DEMOGRAPHIC AND DESCRIPTIVE VARIABLES FOR RECRUITS COMPLETING BASIC TRAINING (GP1) AND THOSE DISCHARGED FOR MEDICAL OR ADMINISTRATIVE REASONS (GP2) COLLECTED PRIOR TO TRAINING

	Males		Females	
Variables	(N=751) Completed Basic	(N=103) Discharged	(N=399) Completed Basic	(N=54) Discharged
Comparative Fitness Level	3.07 ± 0.8	2.79 ± 0.9**	2.86 ± 0.7	2.54 ± 0.8**
Activity History	3.50 ± 0.7	3.27 ± 1.1*	3.25 ± 0.9	2.98 ± 0.9*
Age (yrs)	19.9 ± 2.6	20.1 ± 3.3*	20.61 ± 3.1	21.2 ± 3.4**
Height (cm)	174.3 ± 6.5	173.78 ± 6.6	162.66 ± 6.7	162.5 ± 7.5
Weight (kg)	70.8 ± 11.7	68.9 ± 11.2	59.0 ± 7.2	59.6 ± 7.0
BodyFat (%)	16.2 ± 5.1	11.4 ± 6.1*	27.9 ± 4.7	28.1 ± 5.6
Lean Body Mass (kg)	59.0 ± 6.8	57.2 ± 6.5**	42.3 ± 4.3	42.4 ± 3.9
Aerobic Test HR (bpm)				
HR 1	122.5 ± 13.6	124.8 ± 13.2	124.6 ± 14.6	126.4 ± 13.9
HR 2	142.2 ± 14.1	145.0 ± 15.0	145.7 ± 16.0	147.9 ± 15.0
HR 3	162.3 ± 15.0	165.7 ± 15.6	165.8 ± 15.3	167.6 ± 14.3
Isometric Strength (kg)				
Leg	143.3 ± 38.5	136.0 ± 34.3**	92.7 ± 29.6	86.4 ± 27.4**
Torso	97.5 ± 18.1	92.4 ± 22.6**	55.3 ± 11.4	53.0 ± 9.0
Trunk	72.5 ± 18.3	71.8 ± 19.7	47.8 ± 13.1	44.7 ± 13.9**
HOS	29.2 ± 6.1	31.4 ± 8.1**	30.8 ± 5.9	32.6 ± 6.0**
RTLP	59.5 ± 8.8	56.8 ± 10.2**	59.2 ± 8.9	57.7 ± 8.3*

*$p \leq .05$

*$p \leq .01$

TABLE 3. SUMMARY TABLE OF STEPWISE DISCRIMINANT ANALYSIS FOR RECRUITS COMPLETING BASIC TRAINING (GP1) AND RECRUITS DISCHARGED (GP2) FROM SERVICE

FEMALE

STEP	VARIABLES	APPROXIMATE F-STATISTIC	DF	SIGNIFICANCE LEVEL
1	Comparative Fitness	9.66	1/451	.01
2	HOS	6.20	2/450	.01
3	Age	4.92	3/449	.01
4	Trunk Strength	3.97	4/448	.01
5	Leg Strength	3.30	5/447	.01

MALE

STEP	VARIABLE	APPROXIMATE F-STATISTIC	DF	SIGNIFICANCE LEVEL
1	HOS	11.09	1/852	.001
2	Comparative Fitness	9.02	2/851	.01
3	LBM (kg)	7.82	3/850	.01
4	RTLP A	6.65	4/849	.01
5	Age	5.56	5/848	.01

MALES AND FEMALE COMBINED

STEP	VARIABLE	APPROXIMATE F-STATISTIC	DF	SIGNIFICANCE LEVEL
1	Comparative Fitness	20.24	1/1319	.001
2	HOS	14.88	2/1318	.001
3	RTLP A	10.86	3/1317	.001
4	Age	8.61	4/1316	.01
5	Body Fat (%)	7.17	5/1315	.01

TABLE 4. CORRECT CLASSIFICATION USING DISCRIMINANT FUNCTIONS OBTAINED FOR RECRUITS COMPLETING BASIC TRAINING (GP1) AND RECRUITS DISCHARGED (GP2) FROM SERVICE

MALES	PERCENT OF CORRECT CLASSIFICATION	NUMBER OF CORRECT CLASSIFICATION
Completing Basic Training	87.6	658/751
Discharged From Service	29.1	30/103
Total Correct Classification	80.6	688/853
FEMALES		
Completing Basic Training	87.7	350/399
Discharged From Service	29.6	16/54
Total Correct Classification	80.8	376/452
MALES AND FEMALES COMBINED		
Completing Basic Training	88.6	1029/1161
Discharged From Service	25.0	40/160
Total Correct Classification	80.9	1069/1319

TABLE 5. STEPWISE MULTIPLE REGRESSION OF RECRUIT PERFORMANCE ON CRITERION TASKS[1]

AT THE END OF TRAINING WITH TEST BATTERY PERFORMANCE PRIOR TO TRAINING

	VARIABLES	R	R^2
a) Fitness tent			
One Mile Run	Leg Strength + Upper Torso	-.59	.35
Push Ups	Upper Torso + Leg Strength	.56	.31
b) Common soldiering task			
Road March w/Equipment 8 km	Leg + Upper Torso Strength	-.51	.26
Dig 3x5x1.5 ft. Emplacment	Upper Torso + Trunk Strength	-.45	.21
Lift & Carry 8 Sand Bags 22 kg 50 m	Upper Torso Strength	-.62	.39
Low-High Crawl 75 m	Upper Torso Strength	-.67	.45
Dash 75 m	Upper Torso Strength + Leg Strength	-.67	.45

[1] Pre-baseline training program for basic training.
US Army Infantry School, Ft. Benning, GA Sep 77.

Figure Legends

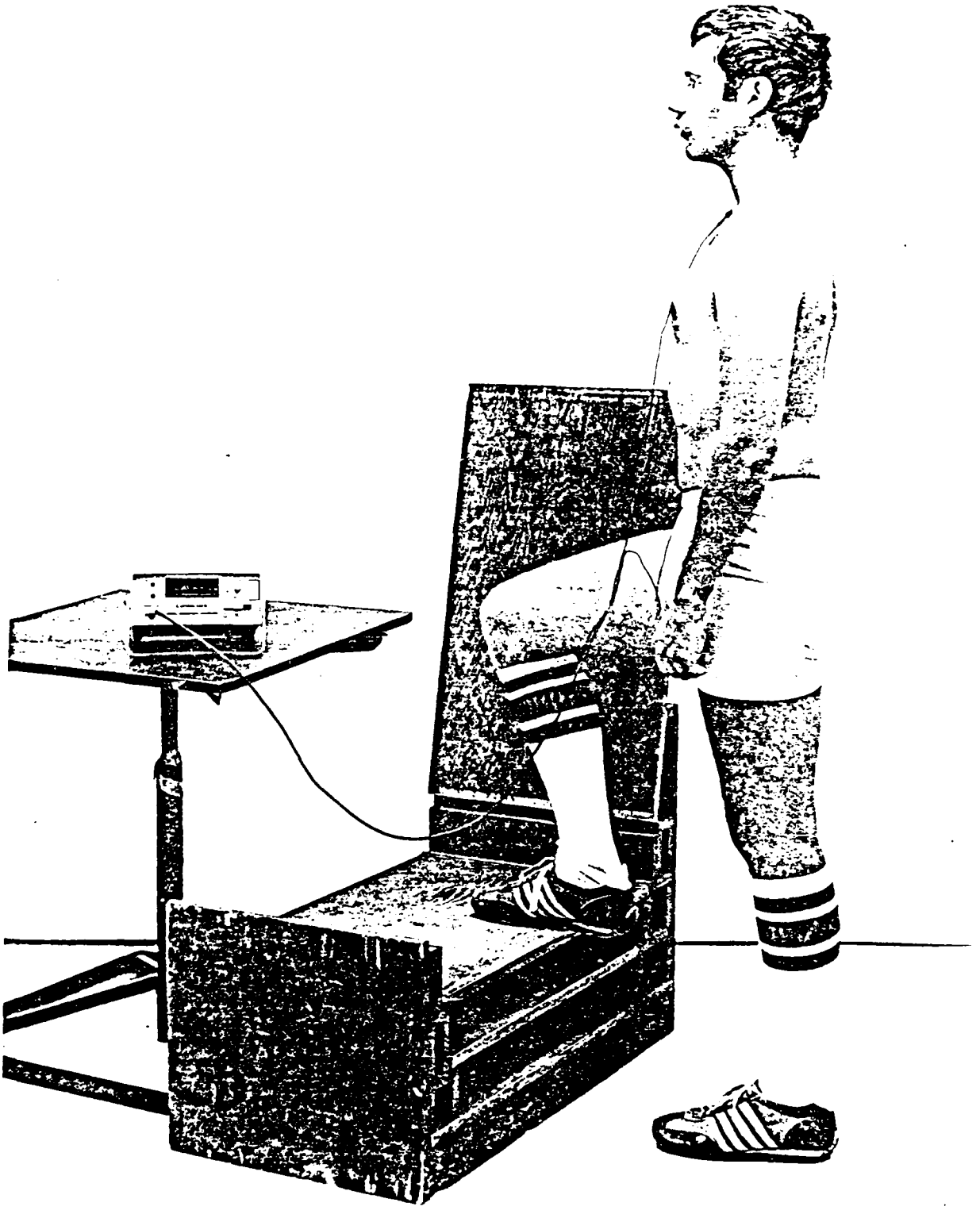
Fig 1 Subject performing stepping test with heart rate monitor attached

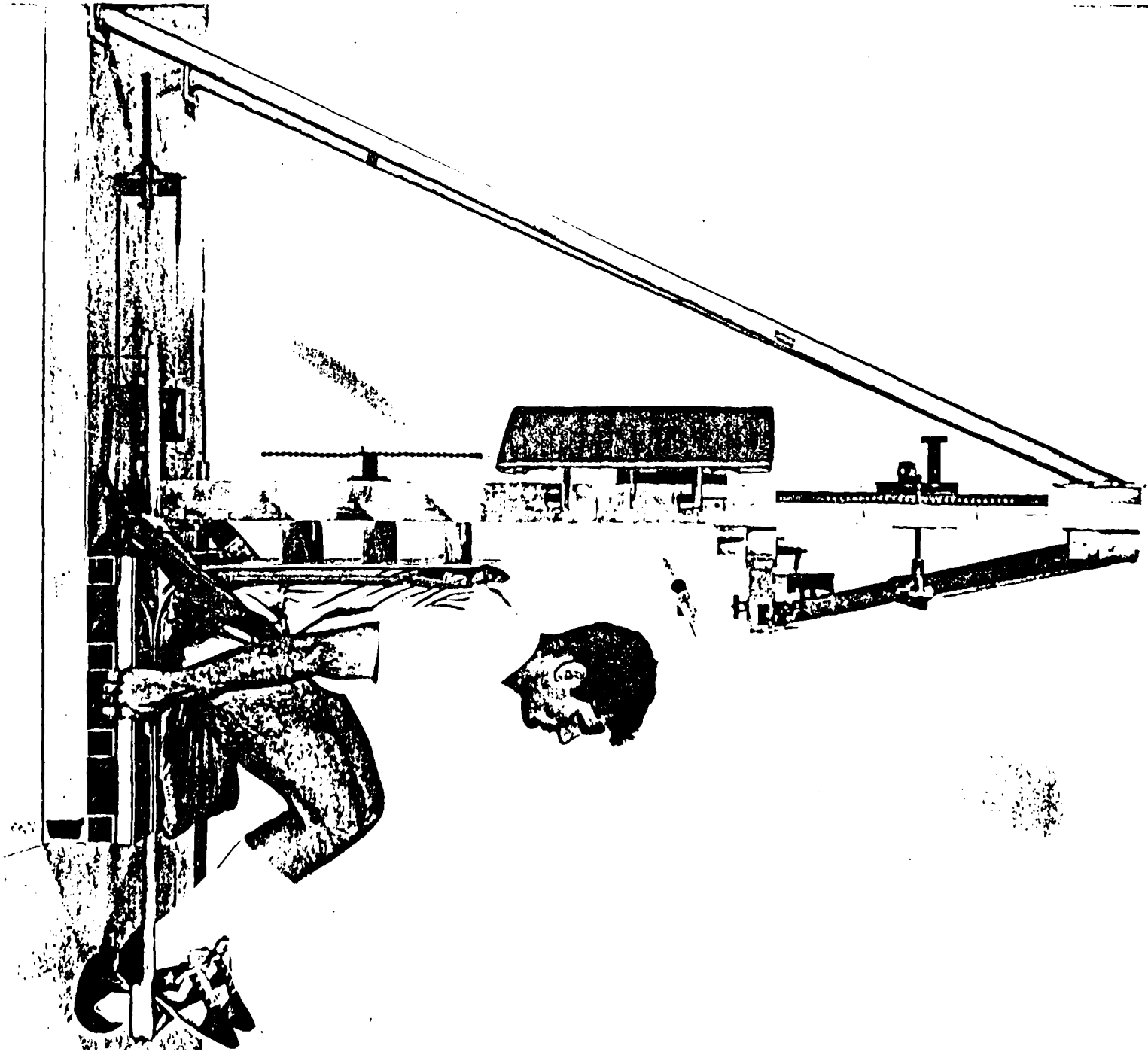
Fig 2 Standard positioning for the measurement of leg extensor strength

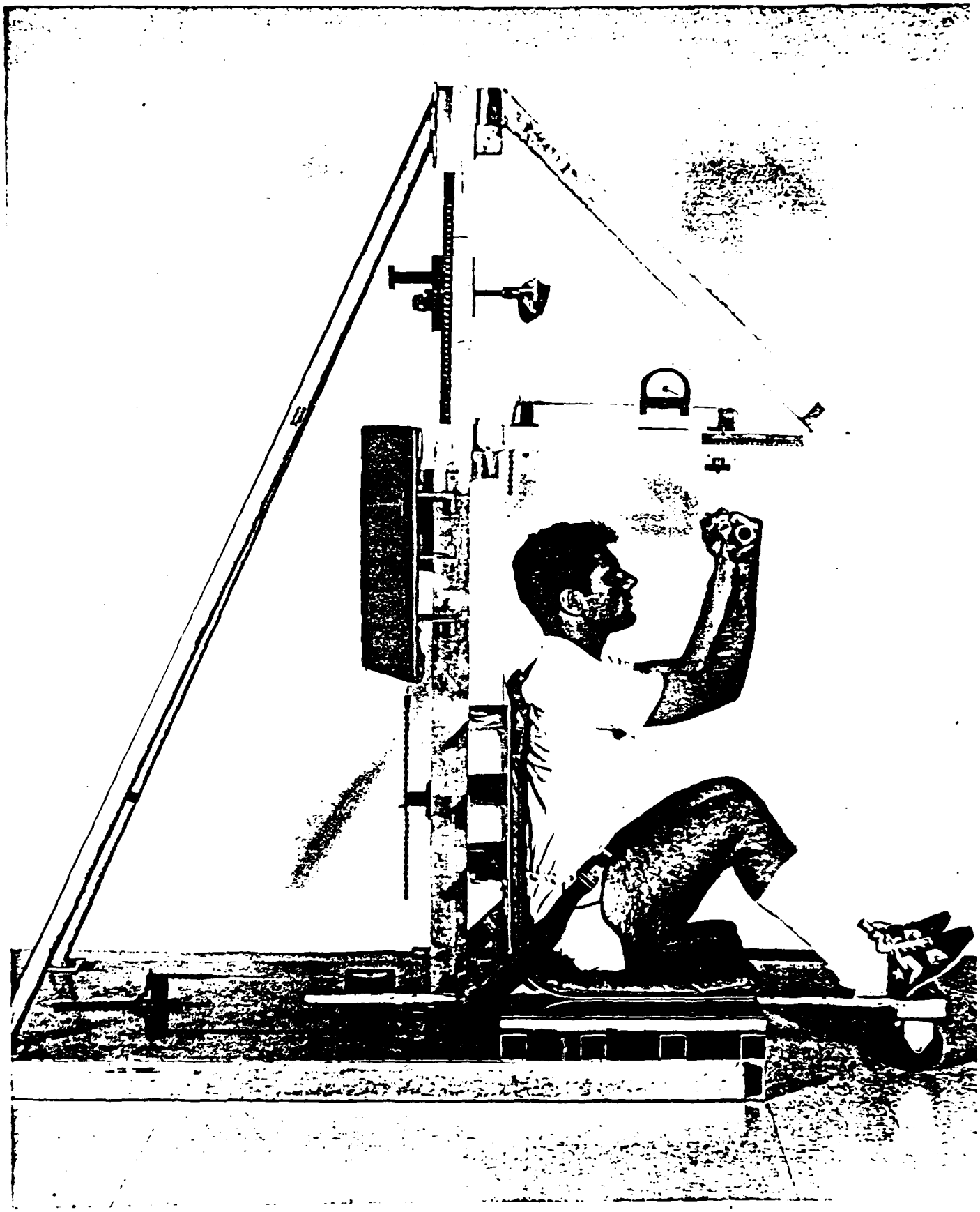
Fig 3 Standard positioning for the measurement of upper torso strength

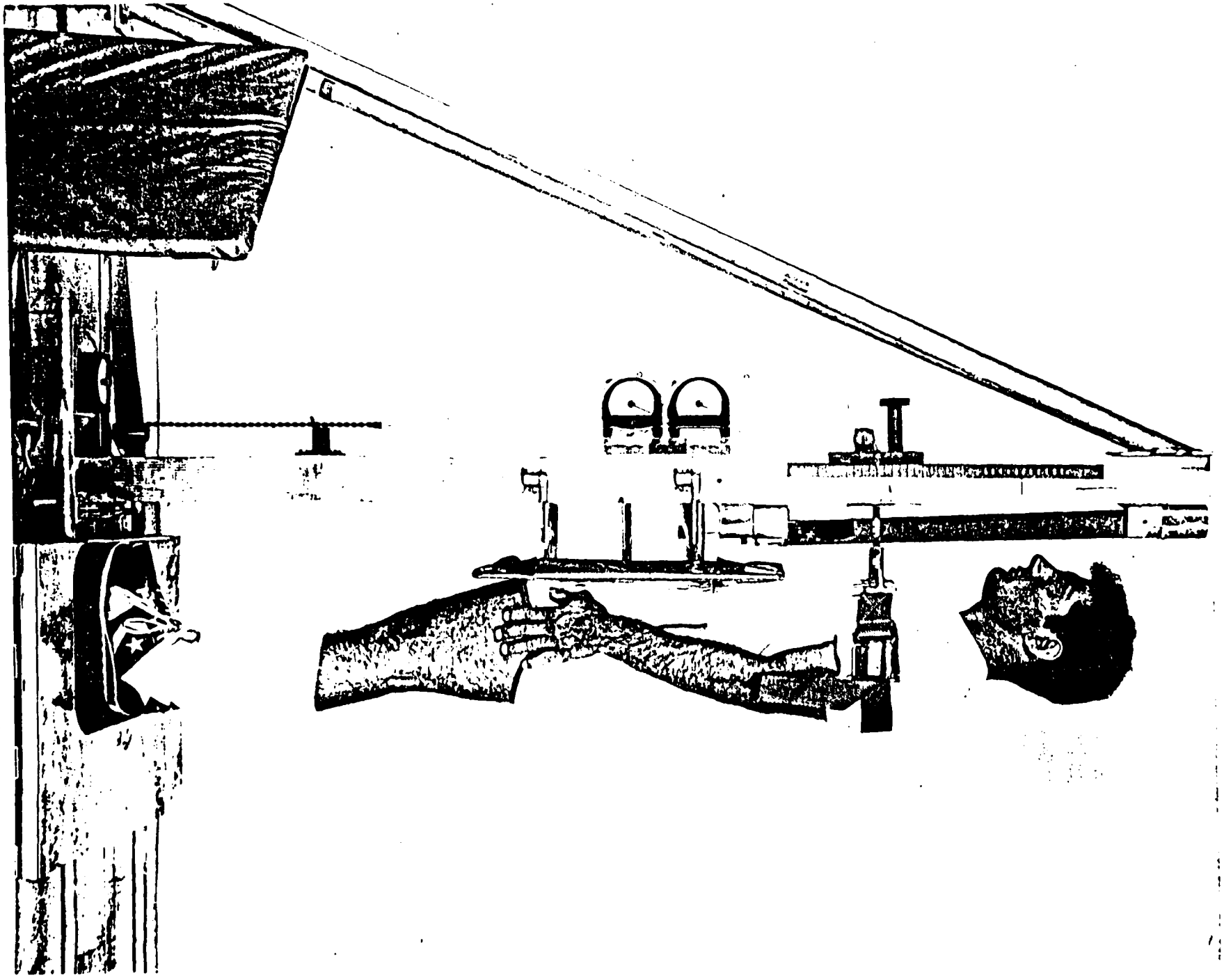
Fig 4 Standard positioning for the measurement of trunk strength

Fig 5 Comparison of males and females on selected physical measures. Bars represent means and 1 SD range of measured factor for females as compared to males









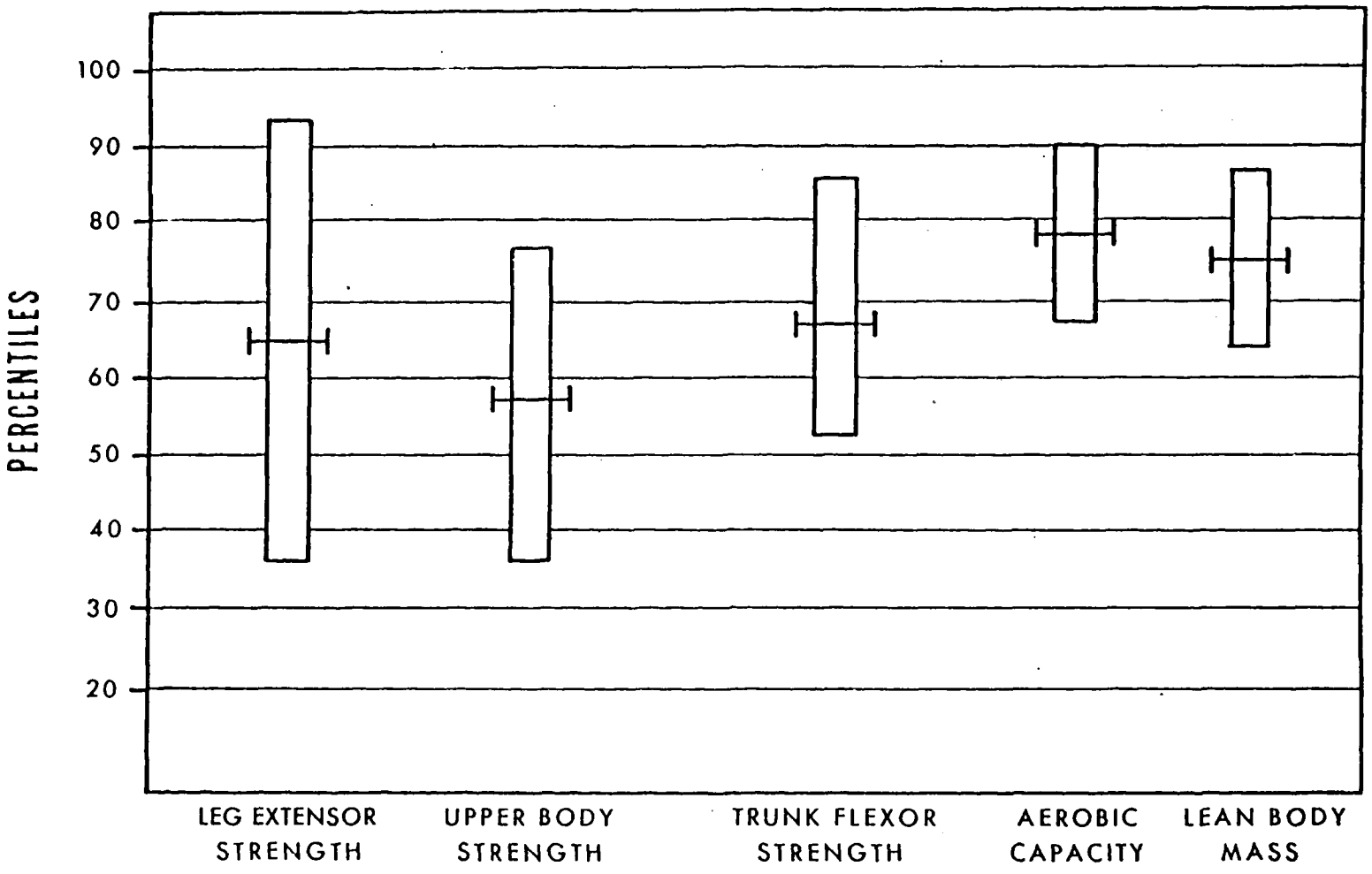


FIGURE 6. WOMENS PHYSICAL CHARACTERISTICS SHOWN AS PERCENT OF MENS. VALUES REPRESENT MEAN AND SD.

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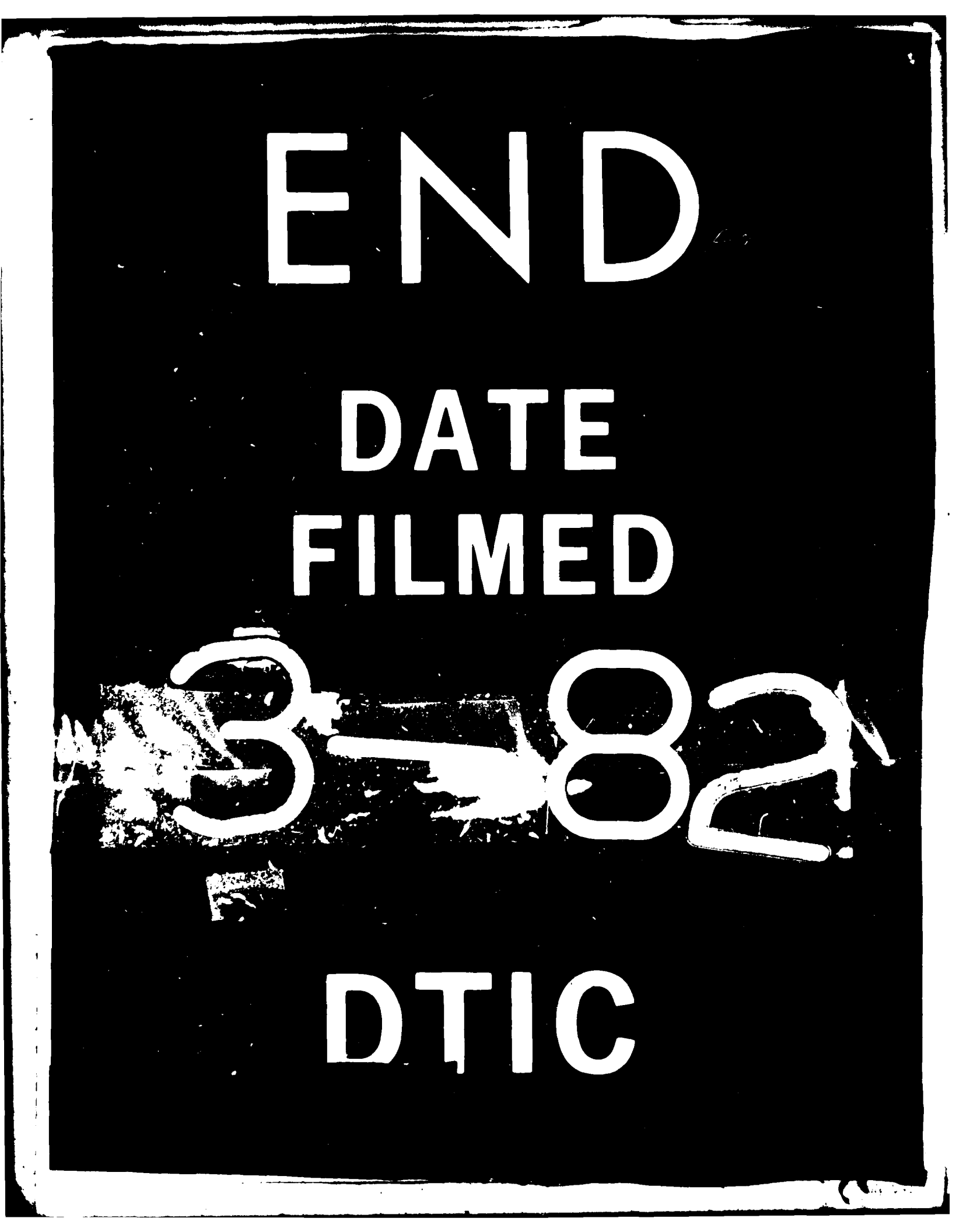
The present research evaluated aspects of physical work capacity, background, and psychological coping strategies and their relationship to criterion military task performance and attrition from basic training. It attempted to develop a selection instrument that could be utilized as a part of a pre-training screening device to optimize both personnel selection and subsequent occupational assignment and training in the U.S. Armed Forces. Thirteen hundred men and women recruits were measured at the beginning of recruit training; subsequent discriminant analysis of graduates and dropouts demonstrated significant differ-

ences on five variables, including physical self comparison, reports of physical ailments, ability to cope with situational stress, body composition and age and correctly classified 30% dropouts. When these variables were subjected to a stepwise multiple regression, a predictive validity of .50 and .04 was observed for female and male dropouts respectively. Likewise, the use of multiple regression for the prediction of criterion task performances resulted in significant multiple Rs ranging from .45 to .67 using strength measurement alone. The results support the usefulness and efficacy of a multivariate test device for the identification of dropouts and the prediction of selected task performance prior to training. The application of the findings to the personnel selection and training process have varied implications which are discussed.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